Universidad Rey Juan Carlos

TEACHING GUIDE

Sustainability and Social Responsibility

GRADO EN INGENIERÍA BIOMÉDICA (INGLÉS) (1º y 2º curso)

ACADEMIC YEAR 2026-27

Q2803011B UNIVERSIDAD REY JUAN CARLOS
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Publication date: 02-07-2026

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I.-Subject Identification	
Type	FORMACIÓN BÁSICA
Teaching period	1 course, 2Q semester
Nº of credits	6
Language in wich the subject is taught	English

II.-Presentation

This course is of a transversal nature for students entering the university. The major challenges of global citizenship in the 21st century, their complexity, and interrelationships are presented, inviting the student to face them from a critical and systemic thinking perspective. We begin by understanding how a scientific and evidence-based analysis makes it possible to visualize critical issues that threaten human societies and the planet we live on, of which we are a part. It introduces the social and environmental crises that human societies must inevitably face with changes and effective measures to make a socially and environmentally sustainable future viable.

Once these issues have been reviewed from a holistic and global perspective, we then move on to environmental and social issues, the regulatory and legal framework, and the economic causes and consequences of these crises, as well as possible solutions. Finally, all of this is particularly relevant to students and future professionals in biomedical engineering, as it identifies specific aspects of ICT relevant to social and environmental sustainability, and the discipline's ability to contribute to a just ecosocial transition.

The philosophy behind placing this subject at the beginning of the studies is the exhortation made by the 2030 Agenda in its Goal 4.7, by CRUE-Sustainability, by UNESCO, by the European Commission, and by Spanish law in RD 822/2021, Art. 4, to introduce throughout university studies transversal competencies related to what can be globally called social and environmental sustainability. For this introduction of transversal competences in technical studies to be possible, it is essential to have a first encounter with the concepts, analysis and debates surrounding the great challenges of global citizenship today, in order to then be able to address these issues in a transversal manner in the rest of the subjects as appropriate.

III.-Learning outcomes

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COM12. Ability to carry out professional activities with a critical perspective and an active commitment to social, economic, and environmental sustainabili-ty, while respecting human rights and democratic institutions. This includes the capacity to contrib-ute specifically to the achievement of development objectives related to their field of knowledge.
COM16. Ability to identify, formulate and solve engineering problems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to recognise the importance of non-technical ¿societal, health and safety, environmental, economic and industrial ¿ constraints. (EURACE 2.2)
COM17. Ability to develop and design complex products (devices, artefacts, etc.), processes and systems in their field of study to meet established requirements, that can include an awareness of non-technical ¿ societal, health and safety, environmental, economic and industrial¿ considerations; to select and apply relevant design methodologies. (EURACE 3.1)
COM21. Ability to gather and interpret relevant data and handle complexity within their field of study, to inform judgements that include reflection on relevant social and ethical issues. (EURACE 6.1)
COM22. Ability to manage complex technical or profes-sional activities or projects in their field of study, taking responsibility for decision making. (EURACE 6.2)
COM23. Ability to communicate effectively information, ideas, problems and solutions with engineering community and society at large. (EURACE 7.1)
COM24. Ability to function effectively in a national and international context, as an individual and as a member of a team and to cooperate effectively with engineers and non-engineers. (EURACE 7.2)
COM25. Ability to recognise the need for and to engage in independent life-long learning. (EURACE 8.1)
COM26. Ability to acquire further knowledge autonomously and follow develop-ments in science and technology. (EURACE 8.2)
CON15. Understand the main challenges facing humanity and the impact of biomedical engineering on society, the economy, and the environment, while respecting democratic values, equality, equity, and tolerance for the diversity of societies.
CON22. Awareness of the wider multidisci-plinary context of engineering. (EURACE 1.3)
CON25. Awareness of non-technical -societal, health and safety, environmen-tal, economic and industrial ¿ implications of engineering practice. (EURACE 5.5)
CON26. Awareness of economic, organizational and managerial issues (such as project management, risk and change management) in the industrial and business context. (EURACE 5.6)
HAB18. Ability to conduct searches of literature, to consult and to criti-cally use scientific databases and other appropriate sources of information, to carry out simulation and analysis in order to pursue detailed investigations and research of technical issues in their field of study. (EURACE 4.1)
HAB20. Ability to apply norms of engi-neering practice in their field of study. (EURACE 5.4)

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.
- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.

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IV.-Contents

IV.A.-Syllabus

INTRODUCTION

• Presentation of the course. Relevance, context within the degree program, and scientific framework.

• Selection and presentation of the course project and formation of groups.

BLOCK I.- Global change. General frameworks, models, and dimensions of sustainability

• Topic 1: Global change and challenges for a sustainable world and societies: Major global challenges today. Past and present agendas for addressing these challenges, as well as multilateral frameworks. Dimensions of sustainability: environmental, social (and cultural), economic, etc., and the interrelationship between them. Limits, carrying capacity, and the strong sustainability paradigm.

BLOCK II.- Environmental dimension of sustainability

• Topic 2: The scientific method and the construction of scientific knowledge. Relevance of scientific evidence in society.

• Topic 3: Causes and effects of biodiversity loss. Ecosystem services.

• Topic 4: Climate change.

• Topic 5: Causes and effects of environmental pollution in ecosystems.

• Topic 6: Changes in land use and overexploitation of resources.

• Topic 7: One Health.

BLOCK III.- Social dimension of sustainability and legal framework

• Topic 8: Poverty, exclusion, inequality, and environmental justice: theoretical perspectives and tools for understanding the contemporary world.

• Topic 9: Theories of development and the concepts of social change and cultural diversity.

• Topic 10: The construction of social commitment and strategies for a just transition. Alternative ways of inhabiting the world: social movements and alternatives to dominant development.

• Topic 11: Sustainability and social commitment from a legal perspective.

• Topic 12: International legal framework for sustainability.

• Topic 13: Ethics and Human Rights.

BLOCK IV.- Economic dimension: complexity in sustainability models and framework for economic policy action

• Topic 14: Fundamentals of Economics.

• Topic 15: Schools of economic thought. Planetary boundaries from an economic perspective.

• Topic 16: Decision-making by economic agents in resource management and inequalities.

• Topic 17: Corporate Social Responsibility, ESG, and sustainability in business.

BLOCK V.- Issues related to sustainability and tools for a just eco-social transition from biomedical engineering

• Topic 18: Issues relevant to social and environmental sustainability in the professional life of biomedical engineering. Social and environmental impact on actions and projects. Enabling biomedical technologies for just eco-social transformation. Success stories.

• Presentation of projects.

IV.B.-Training activities

Type	Title
Theoretical sessions	Each of the five blocks will include sessions that are entirely or mostly lectures, with student participation included.
Group work	In groups of four, students will work on a challenge that will be set at the beginning of the course. They will apply the knowledge and skills acquired in each block independently, but with the assistance of all the teachers of the subject. In the last two sessions of the course, the work carried out will be presented orally.

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Oral presentations	The work carried out by groups of students throughout the semester, in response to the challenge set at the beginning of the course, will be presented orally in class during the final sessions of the course.
Other activities	In some classes, part of the session will be devoted to opening a discussion with the whole class or in small groups on the issues previously covered.
Test and/or exams	At the end of the course, there will be a theoretical assessment test with questions from the five sections of the syllabus.

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V.-Student workload	
Theoretical sessions	30
Resolution of exercises, problems, case studies, etc.	26
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	0
Tests and/or exams	4
Academic tutorials	8
Related activities: conferences, seminars, etc.	40
Preparation of theoretical sessions and self-study	15
Preparation of practical tasks, exercises, case studies, projects, etc.	42
Preparation for tests and/or exams	15
Total student workload	180

VI.-Methodology and academic programme

Type	Period	Content
Theoretical sessions	Week 1 to Week 13	Master classes
Resolution of exercises, problems, case studies	Week 1 to Week 13	Presentation of case studies to illustrate the theory
Group work	Week 1 to Week 13	Students, working in groups of four, will develop a project throughout the Challenge-Based Learning course.
Academic tutorials	Week 1 to Week 13	Students may request tutorials as needed, both to resolve questions about the course content and to follow up on group work.
Tests and/or exams	Week 14 to Week 15	Oral presentation of work.

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VII.-Assessment methods

The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University.
All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject.
The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call).
Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities.
The distribution and characteristics of the assessment activities are described below.

VII.A.-Description and weight of the assessment activities

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The course is assessed based on the following five activities:

1. **Assignment based on a proposed challenge.** In the first week of the course, a challenge will be presented on which a group of four students must work throughout the semester. As part of their work, they must produce a portfolio that, at a minimum, must include: a concept map developed in class during the last session of Block I, and an expanded version of this map completed at the end of the course; a document for which a template with instructions on structure, format, and scope will be provided, explaining the group's analyses and proposals; and a poster summarizing all of the above. The assessment of this assignment will account for 15% of the final grade. If the assignment does not reach the minimum score of 5 out of 10, the group will receive feedback to improve it and resubmit it during the resit period.
2. **Five submissions for each of the in-person practical activities**, accounting for 15% of the final grade (0.03% per submission). Attendance at 80% of the practical activities is mandatory. In the case of unjustified absence from more than 20% of the practical sessions, the student will be required to take a written exam related to the content of the course's case study during the extraordinary exam, which will account for 15% of the final grade.
3. **Oral presentation of the group assignment**, delivered during the final class sessions, in which each team member's participation will be assessed individually. This activity will account for 10% of the final grade, is non-recoverable, and has no minimum passing mark.
4. **Theoretical exam.** At the end of the course, a theoretical test will be held covering questions from the entire syllabus, including some that may arise during the final sessions in which groups present their work. This activity accounts for 50% of the final grade, but a minimum score of 4/10 must be obtained in order for it to be averaged with the rest. It is recoverable during the resit period under the same conditions.
5. **Individual written exam on the group assignment.** This test will account for 10% of the final grade and requires a minimum score of 5 out of 10. It will include questions related to the group assignment to assess whether students have acquired the expected competencies during its development. It is recoverable during the resit period under the same conditions.

The following table summarizes the above information:

Assessment Systems	Activity	Nature	Type	Minimum grade	Weighting	Period	Content
SE02	Written exam	Individual	Revaluable	4	50%	Regular and extraordinary assessment period	Written test related to the theoretical content of the course
SE02	Written exam	Individual	Revaluable	5	10%	Regular and extraordinary assessment period	Written test related to the contents of the practical case study for the course.
SE03	Oral test	Individual	Non revaluable	No	10%	Week 14 – Week 15	Oral presentation of the work on the practical case study for the course.
SE04	Preparation of scientific-technical document	Group	Revaluable	5	15%	Week 14 – Week 15 and extraordinary assessment period	Group work related to the practical case study for the course
SE04	Preparation of scientific-technical document	Group	Revaluable	5	15%	Week 1 – Week 15 and extraordinary assessment period	5 submissions in each of the in-person practical activities

VII.B. Assessment of students with academic exemption from class attendance

Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.
Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

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VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.

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VIII.-Teaching resources and materials
Basic bibliography
Yayo Herrero y Fernando Cembranos (2019) . Cambiar las gafas para mirar al mundo. Libros en acción. Kate Raworth (2018). Economía rosquilla. 7 maneras de pensar la economía del siglo XXI. Paidós. Jason Hickel (2023). Menos es Más. Cómo el decrecimiento salvará el mundo. Capitán Swing. McDonough, W., &Braungart, M. (2002). Cradle to Cradle: Remaking the Way We Make Things. Antonio Turiel (2024). El futuro de Europa: Cómo decrecer para una reindustrialización urgente. Destino. Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2017). Economía circular: relación con la evolución del concepto de sostenibilidad y estrategias para su implementación. *Memoria Investigaciones en ingeniería*, (15). Juniper, T. (2021). *The Science of Our Changing Planet: From Global Warming to Sustainable Development*. Penguin Books.
Consultation bibliography
Joanna Macy y Chris Johnstone (2018). Esperanza activa: Cómo afrontar el desastre mundial sin volvernos locos. Ediciones La Llave. Miriam Lang, Breno Bringel y Mary Ann Manahan (eds.) (2023). Más allá del colonialismo verde: justicia global y geopolítica de las transiciones ecosociales. Clacso.

IX.-Professors	
Name and surname	IGNACIO PRIETO EGIDO
E-mail address	ignacio.prieto@urjc.es
Department	Teoría de la Señal y Comunicaciones y Sistemas Telemáticos y Computación
Campus	Fuenlabrada
Category	Titular de Universidad
Academic degree	Doctor
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	2
Number of sexennia	2
No. of positive evaluations by Docentia	3
Name and surname	JOSÉ FRANCISCO TRAGANT ESPECHE
E-mail address	jose.tragant.espeche@urjc.es
Department	Economía de la Empresa (ADO), Economía Aplicada II y Fundamentos Análisis Económico
Campus	Fuenlabrada

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Category	Profesor/a Asociado/a
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0
Number of sexennia	0
No. of positive evaluations by Docentia	0
Name and surname	JOSÉ MANUEL ÁLVAREZ MONTOYA
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Department	Estudios Históricos y Sociales, Lengua Española, Literatura, Filosofía Moral y Didácticas Específicas.
Campus	Fuenlabrada
Category	Profesor Sustituto
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0
Number of sexennia	0
No. of positive evaluations by Docentia	0
Name and surname	MARÍA ÁNGELES CANO LINARES
E-mail address	angeles.cano.linares@urjc.es
Department	Derecho Público II
Campus	Fuenlabrada
Category	Titular de Universidad
Academic degree	Doctor
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	6
Number of sexennia	2

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No. of positive evaluations by Docentia	6
Name and surname	SIMONE GUARESCHI
E-mail address	simone.guareschi@urjc.es
Campus	Fuenlabrada
Category	Investigador
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0
Number of sexennia	0
No. of positive evaluations by Docentia	0

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